

We estimate in the past but implement policies in the future.
Dynamic policy effects require future-oriented causal inference.



Definitions:

ATT = Average treatment effect on the treated
ATE = Average treatment effect

Keywords: Causal inference · Dynamic firearm policy effects · External validity



Overcoming the Streetlight Effect: The Role of Time Heterogeneity in Estimating Firearm Policy Effects
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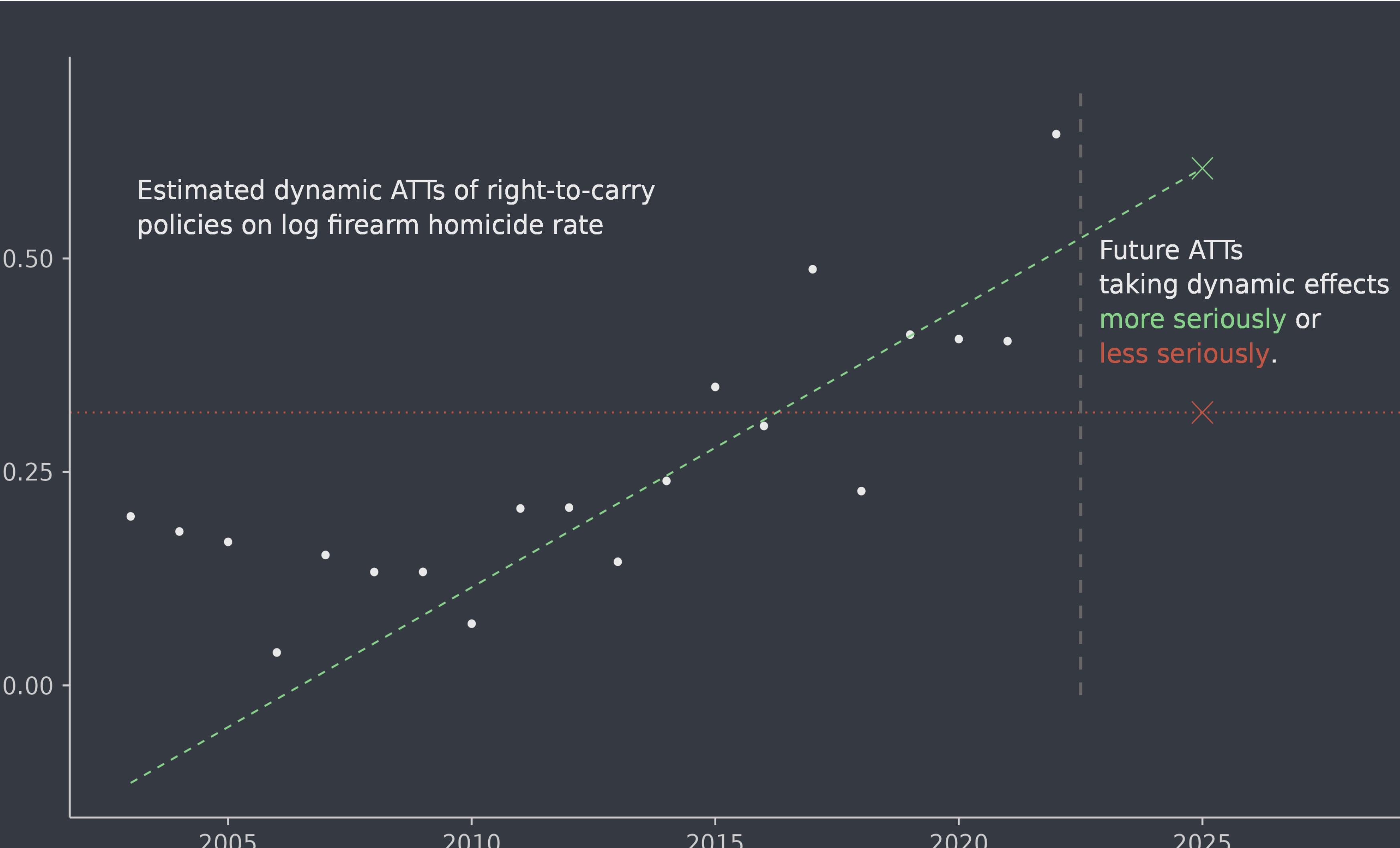
Firearm policies change, and their effects may change, too

- Quantitative studies estimate policy effects on **historical data**
- Public behavior, enforcement, and attitudes shift over time
- Policy effects may therefore change over time
- Studies of right-to-carry laws suggests effects may differ by time of adoption
- Recent difference-in-differences literature stresses dynamic effects

How can estimates on yesterday's data inform policy decisions today if policy effects are always changing?

Analysis of right-to-carry policies in CDC WONDER mortality data, 2001-2022

- Policy data come from RAND State Firearm Law Database
- Dynamic group-time ATT estimates obtained using the `did` package in R
- Taking dynamic effects **more seriously**: projecting group-specific effects to 2025
- Taking dynamic effects **less seriously**: assuming constant group-specific effects
- Influence functions may be used to obtain estimates of variability (not shown)



Two paths forward for quantitative analysis of firearm policies

Take dynamic policy effects **less seriously**

- Assume policy effects do not change over time (homogeneity)
- Past data identifies future impact
- More statistical efficiency, but may not be plausible

Either path translates historical data into insights relevant to future policy decisions

Take dynamic policy effects **more seriously**

- Explicitly model change in policy effects over time
- Extrapolate historical effects to present day
- Acknowledge additional variability due to extrapolation
- Example: policy effects may wane as people adapt